Claims

In accordance with 37 CFR § 1.121, Applicants submit the following complete listing of all

pending claims with markings for the currently Previously Presented claims.

Listing of Claims:

1.   (Currently Amended) A distributed computing network having at least one computing

device, the distributed computing network comprising:

a controlled computing device;

a state table maintained by the controlled computing device and representing an operational

state of the controlled computing device;

a user controller device having user input/output capability for presenting a user perceptible

device control interface for remote user interaction with the controlled computing device to effect a

change in the operational state of the controlled computing device represented in the state table;

a user control point module in the user controller device operating to obtain a copy of the state

table of the user controller device and subscribe to change notifications of the state table; and

an event source module in the controlled computing device operating according to an eventing

model to distribute the change notifications to any subscribing user controller device upon a change to

the state table representing the operational state of the controlled computing device, wherein the

change notifications represent the respective change in the state table, so as to thereby synchronize the

user perceptible device control interface with the changed operational state among said any subscribing

user controller device.

2.   (Original)   The distributed computing network of claim 1 further comprising:

the state table having a plurality of entries, wherein each entry of the state table comprises at least a variable identifier, a type and a current value;

at least one entry of the state table being of a type of data buffer, and containing a file as its current value;

whereby a change to the current value of said at least one entry effects a file transfer from the controlled device to said any subscribing user control device.

3.   (Original)   The distributed computing network of claim 1 wherein the controlled computing device is an embedded computing device.

4.   (Previously Presented)   The distributed computing network of claim 1, further comprising a computer-readable medium controlled computing device having encoded thereon the state table representing the operational state of the controlled computing device, the state table comprising:

a plurality of entries, each entry comprising:

a variable identifier; and

a current value.

5.   (Previously Presented)   The distributed computing network of claim 4 wherein

each entry of the state table further comprises:

a variable type;

a designation of legal values; and

a designation of a default value.

6.   (Previously Presented)   The distributed computing network of claim 5 wherein the

variable type can include a data buffer containing a file, whereby transmission of the state table

between devices effects transfer of the file.

23.   (Original)   In a distributed computing network having a controlled computing

device, a state table maintained by the controlled computing device and representing an operational

state of the controlled computing device, a user controller device having user input/output capability

for presenting a user perceptible device control interface for remote user interaction with the controlled

computing device and communicating with the controlled computing device via a device control

protocol to effect remote operational control of the controlled computing device, a user control point

module in the user controller device operating to obtain the state table of the user controller device and

subscribe to change notifications of the state table, and an event source module operating according to

an eventing model to distribute the change notifications to any subscribing user controller device upon

a change to the operational state of the controlled computing device, so as to thereby synchronize the

user perceptible device control interface with the changed operational state among said any subscribing

user controller device, a method of maintaining data representing a current state of the controlled

computing device at the user controller device, the method comprising:

responsive to a controlled device state subscription request of the user controller device per a

subscription eventing model, distributing an initial controlled computing device state event having a

predefined initial sequence number and data defining a present state of the controlled computing

device to the user controller device;

upon changes in the controlled device state, distributing controlled computing device state

update events having sequence numbers assigned according to a sequential order following the

predefined initial sequence number and data defining said changes to the user controller device; and

in response to a renewed controlled device state subscription request, recommencing

distributing the initial controlled computing device state event and controlled computing device state

update events to the user controller device so as to permit the user controller device to reinitialize to

the controlled computing device's present state upon failure to receive the controlled computing device

state update events in sequential order of their assigned sequence numbers.

24.   (Original)   The method of claim 23 wherein the predefined initial sequence number

is zero.

25.   (Original)   The method of claim 23 wherein the data in the initial controlled

computing device state event is a complete state table defining the controlled computing device's

present state, and the data in the controlled computing device state update events define updates in part

of the state table.

26.   (Original)   A controlled computing device operational in accordance with the

method of claim 23.

27.   (Original)   In a distributed computing network having a controlled computing

device, a state table maintained by the controlled computing device and representing an operational

state of the controlled computing device, a user controller device having user input/output capability

for presenting a user perceptible device control interface for remote user interaction with the controlled

computing device and communicating with the controlled computing device via a device control

protocol to effect remote operational control of the controlled computing device, a user control point

module in the user controller device operating to obtain the state table of the user controller device and

subscribe to change notifications of the state table, and an event source module operating according to

an eventing model to distribute the change notifications to any subscribing user controller device upon

a change to the operational state of the controlled computing device, so as to thereby synchronize the

user perceptible device control interface with the changed operational state among said any subscribing

user controller device, a method of maintaining data representing a current state of the controlled

computing device at the controller computing device, the method comprising:

sending from the user controller device a state subscription request conforming to a

subscription eventing model by which the controlled computing device distributes sequentially

numbered state events to subscribing devices commencing with an initial state event that conveys a full

data representation of a state of the controlled computing device and continuing with state update

events that convey partial updates of the controlled computing device state;

upon receiving the initial state event, initializing storage at the user controller device of a

representation of the controlled computing device's state with the full data representation in the initial

state event;

upon receiving state update events, updating the storage with the partial updates; and

upon a failure to receive a state update event in accordance with their sequential numbering,

repeating the actions of sending the state subscription request, initializing the storage and updating the

storage.

28.   (Original)   The method of claim 27 wherein the sequential numbering of the state

events begins with a predefined initial sequence number.

29.   (Original)   The method of claim 27 wherein the data representation of the controlled

computing device's state is in the form of a state table.

30.   (Original)   The method of claim 27 further comprising:

producing a user control interface display at the user controller device based at least in part on

the representation of the controlled computing device's state in the storage.

31.   (Original)   The method of claim 27 further comprising:

sending from the user controller device a control command for an operation of the controlled

computing device depending at least in part on the representation of the controlled computing device's

state in the storage.

32.   (Original)   A user controller device operational in accordance with the method of

claim 27.

33.   (Original)   A computer readable software carrying medium having computer

software carried thereon for implementing a peer networking control protocol for a plurality of control

point computing devices in a distributed data communications network to effect control of a controlled

computing device, the distributed data communications network having the controlled computing

device, a state table maintained by the controlled computing device and representing an operational

state of the controlled computing device, a control point computing device having user input/output

capability for presenting a user perceptible device control interface for remote user interaction with the

controlled computing device and communicating with the controlled computing device via a device

control protocol to effect remote operational control of the controlled computing device, a user control

point module in the control point computing device operating to obtain the state table of the control

point computing device and subscribe to change notifications of the state table, and an event source

module operating according to an eventing model to distribute the change notifications to any

subscribing control point computing device upon a change to the operational state of the controlled

computing device, so as to thereby synchronize the user perceptible device control interface with the

changed operational state among said any subscribing control point computing device, the computer

software comprising:

a subscription registration program module operative when executed on the controlled

computing device to register, in response to a subscription request of the control point computing

device, such device as a subscribing control point computing device to receive state events from the

controlled computing device;

a state eventing program module operative when executed on the controlled computing device

to distribute state events to the subscribing control point computing device, and further operative to

assign sequence numbers to the state events in sequential order, the state events commencing with an

initial state event having data for initializing a controlled computing device state table stored at the

subscribing control point computing device to reflect a then present state of the controlled computing

device, the state events continuing with state update events having data for updating the controlled

computing device state table to reflect a changed state of the controlled computing device; and

the subscription registration program module further operative in response to a renewed

subscription request of the subscribing control point device to cause the state eventing program module

to recommence distributing a further sequence of initial state event and state update events to the

subscribing control point computing device so as to permit the subscribing computing device to

reinitialize its stored controlled computing device state table after failure to receive the state update

events in sequence.

34.   (Original)   A computer readable software carrying medium having computer

software carried thereon for implementing a peer networking control protocol for a plurality of control

point computing devices in a data communications network to effect control of a controlled computing

device, the data communications network having the controlled computing device, a state table

maintained by the controlled computing device and representing an operational state of the controlled

computing device, a control point computing device having user input/output capability for presenting

a user perceptible device control interface for remote user interaction with the controlled computing

device and communicating with the controlled computing device via a device control protocol to effect

remote operational control of the controlled computing device, a user control point module in the

control point computing device operating to obtain the state table of the control point computing

device and subscribe to change notifications of the state table, and an event source module operating

according to an eventing model to distribute the change notifications to any subscribing control point computing device upon a change to the operational state of the controlled computing device, so as to thereby synchronize the user perceptible device control interface with the changed operational state among said any subscribing control point computing device, the computer software comprising:

a state subscriber program module operative when executed on a control point computing device to communicate from the control point computing device a state subscription request conforming to a subscription eventing model of the peer networking control protocol by which the controlled computing device distributes sequentially numbered state events to subscribing devices commencing with an initial state event that conveys a full data representation of a state of the controlled computing device and continuing with state update events that convey partial updates of the controlled computing device state;

a controlled device state storage initialization program module operative when executed on the control point computing device to in response to the initial state event to initialize storage at the control point computing device of a data structure representation of the controlled computing device's state according to the full data representation in the initial state event;

a controlled device state update program module operative when executed on the control point computing device to in response to the state update events to update the data structure representation in the storage according to the partial updates in the state update events; and

a sequence validation program module operative when executed on the control point computing device to detect a failure to receive any of the state events as per their sequential numbering, and operative upon detecting such failure to cause the state subscriber program module to communicate a renewal state subscription request from the control point computing device so as to re-commence distribution of sequentially numbered state events with a renewed initial state event from the controlled

computing device in conformance with the subscription eventing model and thereby effect re-

initialization of the data structure representation by the controlled device state storage initialization

program module.

35.   (Original)   The computer readable software carrying medium of claim 34 further

comprising:

a user control interface display program module operative when executed on the control point

computing device to display a user control interface display at the control point computing device

based at least in part on the stored data structure representation of the controlled computing device's

state.

36.   (Original)   A peer networking state eventing and control protocol method for

effecting state-concurrent multi-master control of a controlled computing device by a plurality of

control point computing devices communicating on a data communications network, the data

communications network having the controlled computing device, a state table maintained by the

controlled computing device and representing an operational state of the controlled computing device,

a control point computing device having user input/output capability for presenting a user perceptible

device control interface for remote user interaction with the controlled computing device and

communicating with the controlled computing device via a device control protocol to effect remote

operational control of the controlled computing device, a user control point module in the control point

computing device operating to obtain the state table of the control point computing device and

subscribe to change notifications of the state table, and an event source module operating according to

an eventing model to distribute the change notifications to any subscribing control point computing

device upon a change to the operational state of the controlled computing device, so as to thereby

synchronize the user perceptible device control interface with the changed operational state among said

any subscribing control point computing device, the method comprising:

from a plurality of the control point computing devices, receiving state eventing subscription

requests;

responsive to the state eventing subscription requests, registering subscriptions of the respective

control point computing devices to state events from the controlled computing device;

communicating state events having information descriptive of a state of the controlled

computing device to the respective control point computing devices of the registered subscriptions;

receiving a control command from a control point computing device instructing the controlled

computing device to perform a specified operation affecting the state of the controlled computing

device;

responsive to the control command, performing the specified operation; and

communicating further state events having information descriptive of the state of the controlled

computing device after the specified operation is performed to the respective control point computing

devices of the registered subscriptions, whereby the plurality of control point computing devices

having registered subscriptions can maintain concurrent storage of data representing the state of the

controlled computing device.

37.   (Original)   The peer networking state eventing and control protocol method of claim

36 further comprising:

responsive to a state eventing subscription request of a control point computing device,

communicating an initial state event having data defining a full data structure representation of the

state of the controlled computing device upon registering the subscription of the control point

computing device;

upon changes in the state of the controlled computing device, communicating state update

events having data defining changes to the data structure representation of the state of the controlled

computing device, wherein the initial state event and state update events have sequence numbers

assigned in sequential order; and

in response to a renewed state eventing subscription request, repeating the communicating of

initial state event and state update events, whereby the control point computing device can reinitialize

storage of the data structure representation of the state of the controlled computing device after failure

to receive the state update events in sequential order of their assigned sequence numbers.

38.   (Original)   The peer networking state eventing and control protocol method of claim

36 further comprising assigning the sequence number of the initial state event and state update events

commencing with a predefined sequence number for the initial state event.